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*No. 5.*  
*Samr Mitchell*  
AN EXPERIMENTAL

BOTANICO-MEDICAL ESSAY

*from the author*  
ON THE

*Waffm. March 15. 1804*  
MELIA AZEDARACH

*(Pride of China)*  
OF

LINNÆUS.

---

BY GRAFTON DUVALL,

OF MARYLAND;

HONORARY MEMBER OF THE PHILADELPHIA MEDICAL  
AND CHEMICAL SOCIETIES.

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Nil contemne....omnia probate....quod bonum est, tenete.  
Prodesse quam conspici.

---

PHILADELPHIA:

PRINTED FOR THE AUTHOR, BY HUGH MAXWELL.

.....

1802.

“ Medicus Notitia Plantæ destitutus, de viribus  
“ ejusdem nunquam juste judicavit.”

LINNÆUS.



AN INAUGURAL DISSERTATION,  
FOR  
THE DEGREE  
OF  
DOCTOR OF MEDICINE;

SUBMITTED  
TO THE EXAMINATION  
OF THE  
REVEREND JOHN EWING, S. T. P. PROVOST;

THE  
*TRUSTEES AND MEDICAL FACULTY*

OF THE  
UNIVERSITY OF PENNSYLVANIA,

ON THE 27th DAY OF MAY, 1802.

Samuel L. Mitchell. M.D.

With great respect, from

The Author



7041 5, 1958  
TO THE HONOURABLE GABRIEL DUVALL, ESQ.

OF ANNAPOLIS, MARYLAND.

MY DEAR SIR,

IN the double character of relation and friend, you have a double claim on my esteem and affection. I experience much more pleasure in thus publicly tendering you my sincere acknowledgments for the friendship, tenderness, and instruction I received during a several year's residence in your amiable family, whilst engaged in my academical studies, than you can feel in accepting them. Long and uniformly accustomed to the performance of kind and benevolent actions, hostile to all vanity and ostentation, and seeking only to do good, for virtue's sake, and not to court fame or popularity, your unaffected modesty leads you ever to avoid all appearance of flattering compliment or empty adulation.

That your valuable life, so highly prized by your fellow-citizens, to whose service it has been so much dedicated, may be long....long extended; that every happiness may await you in this world; and that when our GREAT CREATOR, "through whom we live, move, and have our being," calls you to his own bosom, "to that bourne, whence no traveller returns," you may sink into the grave, without a sigh and without a care, is the truly sincere prayer of

Your affectionate

Friend and Relative,

GRAFTON DUVALL.

## TO DOCTOR JOHN TYLER,

FREDERICK-TOWN, MARYLAND.

IT is much more from a propension of the mind, and a feeling of the heart, than from a mere sense of duty, that I dedicate to you this first fruit of the medical and chirurgical education I received under your friendly instruction.

The professional information, and the great civility, which I have received from you, render it impossible for me to determine whether you are more entitled to my esteem as a preceptor, or to my gratitude as a friend. So faithfully have you discharged the duties of the one, and so kindly have you indulged in the feelings of the other character, towards me, that it were making an ill and undeserved return, not to express the deep sense I entertain of your good qualities.

Accept, then, I beg you, my unfeigned thanks for the politeness you have shewn, and the service you have rendered me, and believe me to be, my dear sir, with every sentiment of gratitude and esteem,

Your sincerely affectionate friend,

And grateful pupil,

GRAFTON DUVALL.

TO CASPAR WISTAR, M. D.

ADJUNCT PROFESSOR OF ANATOMY, SURGERY AND MIDWIFERY,

AND TO

BENJAMIN SMITH BARTON, M. D.

PROFESSOR OF MATERIA MEDICA, BOTANY, AND NATURAL HISTORY  
IN THE UNIVERSITY OF PENNSYLVANIA.

THIS ESSAY is very respectfully inscribed, as an  
unfeigned testimony of the esteem and respect, in which  
they are held, by their

Much-obliged friend,

THE AUTHOR.

---

ALSO

TO DOCTOR LLOYD T. HAMMOND,

OF MARYLAND,

AND TO MR. JAMES HUTCHINSON,

HOUSE SURGEON IN THE PENNSYLVANIA HOSPITAL,

THIS is inscribed, as a genuine token of the un-  
affected regard of their sincere friend and former fellow-  
student,

THE AUTHOR.

IN offering an apology for the incompleteness of this essay, I do not do it with a view to forestal any opinion which may be formed of it; much less do I do it *as a thing of course*. I wish merely to observe, in extenuation of its imperfection, that, owing to the many disappointments I met with in not receiving, in due time, nor did I at last, the various parts of the TREE I have here noticed, I was not enabled to make the numerous experiments and comparative experiments which the subject, being, undoubtedly, an important one, demanded. This truth is sufficiently known to many, who will, therefore, excuse the state in which they find the work. But to those unacquainted with the circumstance, it appears necessary to give them a knowledge of it. Their candour will then lead them to scrutinize with an eye of indulgence, to judge with mildness, and not altogether condemn that, which neither time nor opportunity would allow to be completed.

These observations I address to the candid. For the uncandid I care little. Their decisions will not affect me. Their approbation, no more than their disapprobation, is sought after.

AN ESSAY  
ON THE  
MELIA AZEDARACH  
OF  
LINNÆUS.

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THE *Melia Azedarach* is but little known. So inattentive, indeed, have been all the naturalists and historians, who have noticed this tree, to its virtues, either as it respects its medical powers or its æconomical uses, that a proper investigation of it has never been undertaken. The subject, is, therefore, entirely novel, and I think very deserving the attention of the physician, the botanist, and the chemist. It has been very lately drawn into notice by an equally celebrated as amiable botanist, Professor Barton; and it is due to him to say, that he directed my attention to its examination. In the fullness, however, of my wishes to search into the properties of this beautiful tree, I did not overlook my incompetency to the task. Without a guide to direct, and without authority to support me, it cannot but be expected that the present essay will be imperfect, uninteresting and unsatisfactory. If, nevertheless, I can succeed in clearing away

but a portion of the rubbish which conceals, and expose to the view of future travellers, the path leading to the threshold of inquiry, I shall have accomplished my greatest aim. At least I can be a Pioneer in the pursuit I have proposed, and if my example will lead a more skillful and able experimenter to a successful and complete investigation of it, so far from thinking my labour and attention lost, I shall esteem them as having been advantageously bestowed.

The illustrious Linnæus has arranged the *Azedarach* in the class *Decandria*, order *Monogynia*, and genus *Melia*. He mentions five species, to wit, *Melia Azedarach*, *Melia Sempervirens*, *Melia Dubia*, *Melia Azadiracha*, and *Melia Koetjape*. They are variously characterised in the following manner.

1. *Azedarach*, foliis bipinnatis, foliolis planis. *Cavanill. Diss. Bot. 7. t. 207.*

2. *Sempervirens*, foliis bipinnatis, foliolis rugosiusculis subseptenis. *Comm. b. Amst. 1. t. 76.*

3. *Dubia*, foliis bipinnatis, pinnulis acutis serratis; terminali majore. *Cavanill. Diss. Bot. 7. p. 364.*

4. *Azadiracha*, foliis pinnatis. *Burm. Zeyl. t. 15.*

5. *Koetjape*, foliis ternis. *Burm. Ind.*

Mr. Antonius L. De Jussieu, in his *Genera Plantarum secundum Ordines Naturales disposita*, a great and original botanical work, has introduced an order which he denominates MELIÆ. This is the 11th order of the 13th class in the system of the French botanist. It comprehends the following genera, besides the *Melia*, which gives name to the order; viz. *Winterania*, *Symphonia*, *Tinus*, *Geru-*

ma, Aytonia, Quivisia, Turræa, Ticorea, Sandoricum, Portesia, Trichilia, Elcaja, Guarea, Ekebergia, Aquilicia, Swietenia, and Cedrela. This, upon the whole, is a pretty natural order, as far as respects the botanical affinities of the plants which it contains. Of their medical properties we know but little. It may not, however, be improper to observe, that the Canella Alba of the shops is the produce of a species of Winterania, and that the bark of a species of Swietenia, has lately been found to be an important substitute to the Peruvian bark in the treatment of intermittents and other diseases.

Having thus given an account of its botanical arrangement, together with a general description of the several varieties of the same genus, I will proceed to describe, in a more minute manner, that species of the *Melia* termed *Azedarach*, which I have taken up as the subject of this essay, and which *alone*, as far as has come to my knowledge, is known in this country.

#### THE ROOT.

The root is brachiated, runs in an horizontal direction, and rather superficial, and grows to a considerable thickness.

#### THE TRUNK.

This grows to a great size. Its bark is scabrous. The tree grows to a very great height; and is very ramose and spreading.

#### THE LEAVES.

These are bipinnated or decomposed; are very large, and composed of a number of pinnæ, folioles or leaflets, terminating with an odd one.



## CHARACTERS OF ITS FRUCTIFICATION.

### THE CALYX.

Its *flower cup* is a very small perianthium, composed of a single leaf, divided into five segments, erect and obtuse.

### THE COROLLA.

This consists of five long patent, or expanding *petals* of a linear-lanceolate figure.

### THE NECTARY

Is cylindrical or tubulose, formed of a single leaf, of the length of the Corolla, and divided lightly into ten segments.

### THE STAMENS.

The *filaments* are ten in number, very small, inserted within the top of the Nectary. The *Anthems* not surpassing the Nectary, oblong.

### THE PISTIL

Or *germ* is of a conical form. The *Style* is cylindrical, and of the length of the Nectary. The *Stigma* is obtuse and emarginated, and has five converging valvelets.

### THE FRUIT

Is a soft, globose *Drupe*, of a large size, when ripe of a yellow colour, and is of a fleshy or oily substance.

### THE SEED

Is a *Nut* of a roundish figure, marked with five furrows, and contains five cells, with a single oblong, broadish kernel in each.

### THE FLOWERS

Are of a bright blue purple colour, somewhat like the lilac, in abundance, sitting together on a



large diffused general *Peduncle* or *Panicle*: they are of a pleasant sweet-smell.

The *Melia Azedarach* is a native of the old countries, and is found in many nations. It was originally noticed in Japan, and the growth of it, for some time, was supposed to be confined to that country. Late naturalists and botanists, however, inform us that it has been found native in various parts of the world. Kæmpfer is, I believe, amongst the most early travellers, who, in exploring the wilds of Japan, described our tree. In his history of Japan, he barely mentions it, but in his "*Amœnitates Exoticæ*," I have no doubt but he has entered into a general description of it. I exceedingly regret that I have not been able to meet with and consult this work. In Spain and Italy these trees are planted in gardens to preserve them, where they grow finely\*. They are not supposed to be indigenous in these countries, but to be reared from the berries or seed. In France they are better known, and are supposed to be native in Provence and Languedoc†. They are there preserved in orangeries, and are found of difficult preservation in exposed situations. From these circumstances I am disposed to believe that they are not natural in those provinces, or they would have been very capable of bearing the climate of those places. In Great-Britain, a great deal of attention has not been paid to the tree....A few in some of the public gardens in England are the only ones which I

\* Miller's Gardener's Dictionary (old edit.) Vide *Azedarach*.

† Dictionnaire Universel des Plantes, &c. par Mons: Buchoz Art: *Azedarach*.

can learn to have been in that country. It has therefore not yet been much cultivated there\*. In our own country in Georgia, the Carolinas, and Virginia, it has become naturalized and flourishes to great perfection. In Maryland there are a few, but not much noticed. In the state of Pennsylvania, it is found difficult to preserve them, owing to the tenderness of the plants, and the severity of the Winter's cold. By dint of care, however, and attention, some have been raised to a considerable height, and they have been observed to increase in hardihood, in proportion as they increase in age and size. Hitherto, in those states of our union, in which the Azedarach has been cultivated, it has been found a tree of great ornament, and very capable, by proper management, of being made to afford a fine shade in the hot summer seasons. Perhaps no tree, at least in temperate climates, grows faster, if planted in a rich, loose, dry, or sandy soil, in which they seem most to delight. Instances have been known, of their making shoots of twelve or fifteen feet length in one season in Carolina†.... They are planted near their houses, principally for the beauty of its foliage, and its sweet blue flowers. Its clusters of large yellow berries are not the least of its ornament.

\* Vide Miller's Dictionary (art) Azedarach. And in the "*Hortus Kewensis*," vol. ii. 59. Aiton makes two varieties of the Azedarach, characterizing the one as an "*arbor fraxini folio; flore caeruleo*," vulgarly *common bead tree*; the other "*Azedarach sempervirens et florens*", or *evergreen bead tree*; the first he makes a native of Syria....and the last a native of India.

† This information was given me by Mr. William Bartram, whose botanical knowledge is of a superior degree...Mr. B's reputation being already so firmly established, can gain little addition from my feeble pen.

The Azedarach has been known by a great variety of names in this country. Hitherto I have spoken of it by its botanical name. In Europe, I find it has received but one common name, which is "Bead Tree". It is true there is another variety called the "Evergreen Bead Tree." These names originated from the practice of the monks, and other religious persons, who were in the habit of boring holes through the stones of the fruit, in order to string them as *beads*, with which they repeated their Pater Noster\*. In our country the Azedarach has been variously named. It is called by many the "Pride of India;" others know it by the name of "China Tree," but its most common name is "Poison-Berry Tree"....In many places its appellation is "Pride of China"....By this name it is better known in Virginia than by any other. In this last state there is also a tree known by the name of the "Tallow Tree," but whether it is the same as the "Pride of India," I do not know\*. The inhabitants make use of the oil which surrounds the stone of the fruit, to make candles....I shall, in a subsequent part of this essay shew, that the oil of the fruit of the Azedarach is put to the same purpose. In this their properties resemble.

### CHEMICAL ANALYSIS.

With a view to ascertain the quantity of gum and resin in the bark of the root of the Azedarach; and also to ascertain in which its active quality re-

\* Vide Miller's Dictionary, and Dict. Universal des Plantes, &c. art. Azedarach.

The Tallow tree here mentioned is an indigenous plant growing in the lower part of the state and is not found more than 40 miles from the coast. It is known only by the name of "Myrtle" and from the berries a green resinous substance is obtained frequently used by the natives in making candles. The substance drawn from the berries of this plant is a pretty green

sided, I carefully made a watery infusion and a spiritous tincture. I supposed that the water would extract the gummous, and that the alcohol would dissolve the resinous, part of the plant.

Having suffered these to stand a sufficiently long time, I exposed, in the sun, to evaporation, equal quantities of them, and found that *two* ounces of the infusion deposited *three* grains of the gum, whilst the same proportion of the tincture yielded *twelve* grains of the resin.

I evaporated six ounces of a strong decoction of the same substances, in the same manner, and found the residue an extract, weighing *one* scruple, *eight* grains.

I did not analyse either the bark of the trunk.... the leaves....or the berries. These I was not able to procure.

*The leaves* of the "Pride of India," have never been analysed. Whether they contain any medical virtues, I do not, from experiment, know. In the *Dictionnaire Universel des Plantes*, &c. which I have before mentioned, it is said that the decoction of the leaves of the Azedarach is purgative. Upon what authority this assertion is founded is not related, and for want of the leaves, being at this season of the year not to be had, I was prevented from submitting them to the test of experiment. To do this must be the duty of some future experimenter, whose time and talent cannot be better employed than in the investigation. Hogs, horses, horned cattle, &c. are observed to eat them with impunity, in large quantities and with great avidity; nor have any deleterious effects ever been observed to result therefrom.

*The berries* have a strong disagreeable odour and are believed to be of a poisonous nature. Indeed, Duchoz, in his *Dict. Univer. Plantes*, positively asserts that they are “*very dangerous*.” Whether experience will justify this opinion remains yet to be decided. Large animals, as horses, &c. are noticed to eat the berry without injury, and some of them appear to be particularly fond of them. It does not, however, appear that they are innocuous to birds. The Robin\*, the Mocking-bird†, and various other birds which devour the berries, are observed after eating them, to fall down and are easily caught‡. In accounting for this phænomenon there are two opinions. That which is the most prevalent, is that the berries only injure mechanically, either by distention or strangulation, or both; which distention, or strangulation is supposed to arise from the size, or number, or hardness of the fruit. The other opinion supposes the berry to be endued with an intoxicating, narcotic or poisonous quality, which powerfully exerts its influence on the bird when taken in. I incline to the latter opinion, which I flatter myself I can hereafter shew to be the most plausible. But as it is entirely a matter of doubt, we should not judge hastily. We ought, then, in a case of this kind to resort to experiment, the only safe and sure guide to truth;....but as, from a want of the fruit, this conclusive mode of determining the question is denied us,

\* *Turdus Migratorius*.

† *Turdus Polyglottos*.

‡ “Collections for an Essay towards a *Materia Medica* of the United States, by Benjamin Smith Barton, M. D. professor of *Materia Medica*, Natural History and Botany, in the University of Pennsylvania.” p. 63, sec. edit.



we may, I think, be allowed to wander in the field of speculation, and partially decide by the plausibility of argument.

The advocates for the opinion that the falling down of the birds is caused by strangulation, suppose that this takes place from the quantity they consume, and ascribe the condition of the bird to the distention brought on by the fruit. They suppose too, that the hardness of the berry prevents the bird from swallowing so easily as that it might not be incommoded by its lodgment in a part of the throat. This they suppose corroborated by the fact, that in a short time they rise and fly away, being enabled so to do, by having succeeded in swallowing the berry. In confirmation of this they add, that as the effect is so immediate, it cannot result from any poisonous quality inherent in the berry.

In answer to all this, I ask, why if their convulsion be owing to distention, or strangulation, or both, the same effect does not arise from their consumption of cherries, or any other fruit of equal or superior size and greater hardness? Birds are fonder of cherries, plums, &c. and eat of them in much larger quantities, yet we see not, that these have this violent effect on them. If, too, this convulsion depends on distention, why does not the effect continue whilst the cause remains? We very well know that an effect, arising from the application of a given cause, will continue so long as that cause remains applied, and, I ought to add, sometimes much longer. In this case we cannot suppose the cause so quickly removed as to admit of their flying away, in the short period in which they are found to do, after eating the ber-

ries, and falling down. We can conceive of but two ways, in which the cause could possibly be removed....to wit: First, the digestion, or, secondly, the expulsion of the fruit recently consumed. This, then, being admitted, can we suppose the first to take place in so short a time as is required for the substantiation of the opinion, which I am contending against? And, do we ever observe a discharge, in any way, of the whole or any portion of the berries, the cause of their condition? I answer, unhesitatingly to both questions, in the negative, and I feel a confidence that I do not answer erroneously.

The last argument, I shall attempt to refute, is that which supposes the improbability of so immediate an influence of a narcotic, poisonous, or intoxicating power, as would appear to take place. That there is no improbability in this opinion, uniform and daily experience fully teaches us. We can scarcely conceive a more rapid and active operation of any effective cause, than the application of a narcotic, poisonous, or intoxicating remedy to the living fibre. Is not the operation, and consequently are not the effects, of an Opiate, almost immediate? What are the effects, and how immediate, of a dose of Henbane? How quickly do we observe the intoxication excited by a dose of Æther? In the proportion of the strength of the medicine is the violence of its effects when applied to the body. I might go on and adduce numberless facts and observations of this kind to prove the immediate operation of narcotic, poisonous, or intoxicating substances. But it were an unnecessary, I had almost said, an endless task, neither promising benefit to myself, amusement to those,

whose indulgent eyes may chance to glance over these imperfect pages, nor what is of infinitely more consequence, elucidation to the subject-matter, now under consideration.

But a mere refutation of the arguments against, I do not consider a sufficient support, much less an absolute establishment, of my opinion. We do not, in law, prove a right to property, in possession of another, by shewing the weakness of his claim to it. We must shew a clear, legal title, invested in us, before we can dispossess a tenant. The weakness of another, proves not our strength. We should not, therefore, by being vain and presumptuous depend on the weakness of an adversary, but be cautious and diligent in arming ourselves with power. Pursuing the dictates of this just, sound and well-established principle, I shall not be content in shewing the want of philosophy and plausibility in the arguments opposed to my opinion, but shall go on and enumerate some circumstances, very much tending to prove the correctness of my hypothesis.

A few facts communicated to me by my friend and fellow graduate, Mr. William Nelson, of Virginia, who appears to have paid some attention to the subject, enables me, luckily, to complete my wishes. This gentleman informs me that the flesh of those birds, which have been killed, after eating the berries of the Azedarach, is considerably impregnated with, and obviously contaminated by, their taste. Nor is this all. It is a common observation that the birds which live on the fruit are extremely poor and emaciated. These considerations induce me to believe that the berries of the Azedarach are poisonous, be-



cause if they were innocent, it would certainly run counter to reason to suppose that the effects which I have here recited, resulted from their consumption.

When the tree, with its fruit, was first noticed, some persons there were, who used them in character of edible fruit, but being found to be unpleasant, disagreeable, and some authors say "very dangerous," they were discontinued. Now, although I am not licensed, by personal observation or experiment, to assert that they are uniformly found pernicious or poisonous, we have every reason to conclude that ill effects arose from them, in consequence of which they were rejected as uneatable by the human species. Its most common name in Carolina and Georgia, where it is best known, originated from the idea of its poisonous nature; being therefore called the "Poison-Berry Tree."

If, then, these circumstances be considered in the aggregate, and duly weighed, we may, with some confidence, venture the hypothesis that the fruit of the Azedarach contains a narcotic, poisonous and intoxicating quality. I am sensible that in giving publicity to this opinion, I throw the gauntlet. Be it so. And as the investigation of truth is my only object, I have done it boldly and fearlessly, and with the utmost freedom. Not tied down to any system, nor wedded to a particular opinion, I hold myself bound to acknowledge the truth of the result of any experiment, fairly made, which shall prove the error of the sentiments which I have here advanced. Not having it in my power myself to institute a series of proper experiments, I must commit the task, to those who come after me, who have more leisure to attend to,

more opportunity to search into, and more talent to conduct the investigation of the important subject.

The pulp which surrounds the stone of the fruit of the Azedarach, contains a large quantity of oil. On this account our tree merits much attention, as its produce may be made to serve great æconomical purposes. In process of time, as our lands become cleared and cultivated;...as our forests are hewn down and fertile plains are formed, where there were wet morasses,...as our country becomes thickly inhabited and our citizens shall stand in need of every convenience;...as our arts and sciences shall flourish, and we shall be disposed to profit by every advantage, which is opened to our view;....when, as we become more and more a commercial nation, our manufactures shall be improved and their number increased, ....when we shall have formed a complete *Materia Medica* of our own country, and shall have explored the intricate and untrodden paths of Nature, we shall, I think, find it extremely to our interest in every point of view, to cultivate, with all assiduity, a tree which certainly bids fair to be of boundless value, it being one of the most prolific known.

The consideration that expressed oils are made from numberless trees, shrubs, plants, &c. in various other countries, ought to induce us to attempt the same thing in the growths of our own. No tree, then, will give us so much hope of success as that which is at present under our consideration. Already, indeed, has its value, as it respects the oil it yields, been in some measure, properly estimated in Japan, where it is native, and flourishes luxuriantly. The inhabitants of that country use the oil, which,

after expression, becomes of an hard and firm consistence, like tallow, with which they make candles\*. In this point of view the Azedarach is of immense consequence. To our poor and indigent citizens, who have not often the luxury of a candle-light, this happy fact is of the utmost magnitude. Besides its use amongst ourselves, I would direct the attention of my countrymen to another circumstance, worthy their deep consideration, which is, the cheapness with which this oil, as an article of commerce, might be made, used, sold and exported.

We do not know but that the oil of the fruit of the Azedarach may be of great and extensive application in medicine. Who can say but that its use may supersede that of the equally highly-priced as highly-valued castor oil? Who can tell but that it may in practice be of more value than the oil of olives? Neither do we know but that in the various æconomical uses to which oils are put, this may be preferable to any other.

We are in possession of an important fact, which flatteringly encourages the idea of its value as a medicine. In the small but valuable work, which I have so often quoted, we have recorded as follows;† “ Mr. Andrew Michaux, an intrepid French botanist, informed me, that in Persia, where this tree

\* See Professor Thunburg's travels in Europe, Asia, Africa, &c....vol. iii. p. 228, English translation, London, 1795.

Of this fact, too, Pennant, in his “ View of India Extra Gangem,” vol. iii. p. 229, takes notice.

Dr. Barton taking it from Thunburg, has also recorded it. Vide his Collections, &c. sec. edit. p. 63.

† “ Collections,” &c. p. 62.

grows spontaneously, the pulp, which invests the stone of the fruit is pounded with tallow, and used as an ‘Antipsoric’ in cases of *Tinea Capitis* in children.” Here, then, we find it an important medicine, used in the cure of a most loathsome disease; a disease, too, which is usually of very difficult cure, for it often baffles the utmost skill of the most eminent physicians.

A gentleman of much information from Virginia, with whom I had some conversation on this subject informed me of an attempt, which had been made in his family, to make soap from the oil of the berries of the “Bead Tree.” The attempt was unsuccessful in the end; but it succeeded partially. The gentleman to whom I allude, observing the success, although incomplete, of the attempt, was inclined at that time, and still continues so, to think that the failure arose from a want of skill in the proper process of making soap, no one concerned in the attempt having a competent knowledge on the subject. Although in this case, success did not crown the laudable efforts of this industrious family, it, at least, leaves us the hope, and serves the good purpose of shewing, that it lays in our power, to extract another great advantage from the oil of the fruit of the Azedarach. Here again, the value of this useful tree is enhanced, for if we can, and we have every reason to believe we may, succeed in manufacturing soap from its produce, does it not hold forth, to our industrious citizens, always anxious to promote useful establishments, every prospect of advantage? May it not prove a source, whence we may draw immense and certain profit?

If further experiment demonstrate the possibility of making soap from the oil, we have spoken of, great profits are offered to such as will erect manufactories for this useful and extensively used article. The facility with which this may be accomplished, can only be exceeded by the facility with which the tree yielding the oil can be cultivated. I trust that before a period very remote, new incentives will be exposed to public-spirited characters in our country to form establishments, whereby they cannot fail to profit and under which no danger lurks. We often see individuals, and sometimes associated companies, enthusiastic in their prosecution of idle experiments, from which results ruin in every, the most dreadful shape. Thus, in pursuit of vain and delusive hopes, we find the idea of a mine of copper ore; the belief of the existence of iron in a bank; the rage for examination into any soil, which assumes the appearance, however slight, of containing a metal, will often lead men to the most extravagant pecuniary expenditures to clear out the fountain, whence future wealth was abundantly to flow; whilst if they would calmly permit reason to go uncontrouled, and suffer judgment to sit on its throne, they would more often see the want of foundation for the fabric they were imprudently rearing in their delighted minds, and thus obviate, or rather avoid, the danger of a ruin, in which themselves were not the only sufferers; but in which, numbers already indigent and in want, were, beyond rescue, overwhelmed in the destructive vortex of scheme. This picture is neither exaggerated or highly drawn. Daily observation proves the accuracy and striking likeness of the portrait, and were I to pencil it, with all the imaginable minuteness,



which it might receive, it would appear in much more glowing and vivid colours than I have here represented it.

But to every sensible, well-disposed and reflecting mind, it must be obvious that no such danger can result from an establishment of the manufactories, I have here proposed. The expense incurred in such an undertaking would appear very trifling, when thrown into the scale of comparison, with the sure profits exposed to our view. In the southern states, particularly, these advantages are numerous, peculiar, and great. Here, the tree flourishes to perfection.... Here, the tree is already common, and will in a short time be universal.... Here, its existence is not endangered by any intense coldness of climate. These favourable circumstances render it peculiarly proper that the citizens of these States should undertake the business of forming oil from its fruit; which oil, I flatter myself, I have shewn to be capable of vast application, as well in medicine and œconomy as commerce, and manufacture. With my reflections on this subject, I might proceed and swell my essay to a large size, but the limits of a thesis will not permit, nor will my time enable, me to examine so deeply into the subject, as it would admit, or as its importance would demand. I will now leave it to speak for itself.

#### OF THE TRUNK.

On this subject I have little to say. In the summer season, it is customary to use the bark of the trunk, instead of that of the root. The decoction is made in the same manner as is hereafter directed, when the root is employed.

It would perhaps, however, be not considered as foreign to my purpose, to observe, that in Carolina and Georgia, the wood of the trunk is used to make furniture....of this it makes a very handsome kind.

#### OF THE ROOT.

Hitherto we have but slightly considered the Azedarach as a medicine. It yet remains for me to notice it in this new light. Its medical virtues reside in the root, or rather the bark of the root. It has been more highly estimated in this country as an anthelmintic, than in any other character. It has, therefore, been more regarded as a medicine than as any thing else.

In my inquiries on this subject, I have not been able to trace out the precise period, in which this remedy was discovered, and applied in practice. Neither can I learn, amongst whom the practice of it originated; by whom its virtues were detected, or what fortunate circumstance gave rise to the discovery. It has been said to have been prescribed as far back as sixty years ago, at which time it was known as a vermifuge medicine. By some it was supposed to be of indian origin....but of this I have much doubt, their knowledge of *Materia Medica* being confined to those vegetables only, which are native in our country. As the Azedarach is an exotic, and was introduced into the southern states, bordering on the sea-shore, since the Indians retreated from those places, it is not reasonable to suppose that they had so good an opportunity of observing the medical properties of this tree, as those by whom it was cultivated. In many other cases, accident has given

articles to *Materia Medica*, and origin to many remedies; and it is conjectural that the "Pride of India" owes its origin and notice, as a medicine, to the same source.

Accident has most surprizingly befriended the human race; and we are, I believe, more indebted to this for the detection of medical virtues in various substances, than we are to skill in preparing them. To accident it is, that we are to attribute our knowledge of one of, and for a long time, the most important, remedies in general practical use; I mean the Peruvian bark. This is not a solitary fact. Very many of the same kind might, were it necessary, be adduced. Nor are they of doubtful authenticity; for unless we be disinclined to believe, all which experience, observation and respectability, to say nothing of talent, integrity and veracity, have taught us from the very earliest periods, which have marked the progress of medical and botanical science, we must give credit to, and confide in, the accuracy of this observation.

Amongst practitioners in medicine the Azedarach is scarcely known beyond those limits, within which it grows. It was first prescribed in empirical practice; and physicians having observed, and been assured of, its success in the cure of worms in the human body, adapted it as a remedy. It has now a place in the *Materia Medica*; and is arranged under the head of Anthelmintics, by Professor Barton, who highly esteems it.\* This Professor, to whom *Materia*

\* Vide his MSS Lectures on *Materia Medica*, and also "Collections," &c. pages 39 and 62. (Second Edit.)



Medica, Botany and Natural History, each of which he has enriched with many stores, are so much indebted, was the first who introduced, and still is the only physician, who continues, the practice of it in this state. As yet its use is much circumscribed, but if, from further experience, we can depend upon its exhibition, as, from the trial we have had, I think we may safely and with advantage, it will, doubtless, become a valuable article in our long catalogue of remedies. In this opinion I am confirmed by the authority of Dr. Barton, who thinks "that the *Melia* is, unquestionably, a valuable anthelmintic, and ought to be introduced into general practice."\*

Whether the "China Tree" is peculiarly noxious to either species of worms, usually found in the intestinal canal I am not prepared to decide....indeed, a decision of the question can only be had by great and attentive observation, aided by long experience. The cases in which Dr. Barton prescribed, and found it useful, were those of the *Lumbricus*, or common round worm. The doctor informs us, that he "had not an opportunity of trying how far it is a remedy against the *Tænia*, or tape-worm," adding, "but I am informed that in Carolina it has been used with the effect of discharging great numbers of this species of worm.† A case communicated by my friend and fellow-graduate, Mr. J. C. Geddy, sufficiently testifies, as far as one clearly established case will go, that the *Azedarach* is noxious to the *Tænia*; and that it will expel them.‡ On this account, then, we must

\* "Collections," &c. p. 62.

† Ibid.

‡ Extract from a communication made me by Mr. Geddy....  
"A young gentleman, who had been in a state of indisposi-

coincide with Dr. Barton, "that the Azedarach is doubly entitled to our attention."†

This medicine is used in two forms. The more common preparation of it in Georgia, Carolina and Virginia is the saturated decoction, which is given in large doses. Dr. Barton has sometimes given it in substance in powder, but he has most generally given the decoction. It has not been used in the form of a tincture. Which is the preferable preparation I cannot take upon me to say. It is true I have made some experiments to try their various operations on the pulse, and not being able to give any in clinical cases, I am not prepared to recommend any particular formula of the medicine in practice for the cure of worms.... This being a matter of some importance, will, I hope, hereafter and in a short time, be ascertained fully.

My very intelligent and polite friend, Mr. John Grimes, of Georgia, a student of medicine, to whom I am much indebted for some valuable information on this subject, appears to be very well acquainted with the Azedarach. He has frequently seen it prescribed and has often given it himself, with the most

tion, for a length of time, and under the care of several physicians of great eminence, who had exhibited a number of anthelmintics, without effect, was prevailed on to take a decoction, of the Azedarach.... In 24 hours afterwards, he discharged a worm (a *Tænia*) which measured nearly *sixteen* feet in length. The decoction was continued for some time, when the patient thoroughly recovered his former state of health. Knowing that you are engaged in a series of experiments with, and in an investigation of the Azedarach, I thought it proper to communicate this case to you; which I leave you at liberty to use at your pleasure."

† "Collections," &c. p. 62.

happy effects, and is firmly persuaded of its value as an anthelmintic. Some circumstances with which Mr. Grimes made me acquainted, combined with those observed by Dr. Barton, induce me to believe, that this medicine possesses great strength and active qualities. Superadded to these, some experiments made by myself, and which I shall hereafter relate, confirm the idea, and I think, will give stability to the opinion by placing it beyond the possibility of doubt.

Mr. Grimes informs me that he has known very violent symptoms to take place after the exhibition of this remedy. These some-times alarming effects were generally ascribed to the worms, but I shall presently shew, from the success of the method used to mitigate and relieve them, that this is a mistaken opinion, and that they do really result from the use of the medicine. In a case related to me by this gentleman, wherein, after the Azedarach had been exhibited in large doses, a flushed face; dilatation of the pupil of the eye; coma; subsultus tendinum; oppressed circulation and finally convulsions came on, these terrible symptoms quickly yielded to the free use and sovereign power of the lancet, which was resorted to, and which quickly restored the patient to his wonted state. Now, if these violent symptoms were excited by worms, how could blood-letting, which we all know will not expel these noxious animals, relieve them? I repeat the question, how could blood-letting relieve the effects of a cause, which it could not reach or affect, much less remove? I hope I shall not be misunderstood. Although I am disposed to admit, for it would be absurd to deny

it, that worms may, either by their excess in number or error in their place, by irritation bring on similar symptoms to those above mentioned....and although I would admit that these symptoms might be quieted by blood-letting, yet this relief would be but momentary; for unless the worms upon which depends the appearances we have named, be actually expelled from their resting places, the same symptoms are liable to be reproduced, in a very short time, and continually kept up. Who ever heard of a cure of convulsions, &c. from worms, whilst they yet remained as an offending cause? Where is the credulity which can believe it? But in the case I have mentioned the cure was decisive. It was entire. The same symptoms did not return. Had they depended upon worms they had, doubtless, re-afflicted the patient. The strict analogy between, or rather the absolute identity of, the disease excited by an over-dose of the Melia, as in the instance above related, and that brought on by an excessive dose of opium, leads me to suppose that the same remedy in the one, would as effectually relieve the other affection.

Professor Barton's testimony goes far to prove the dependance of the above-cited symptoms upon the medicine. He says, " in the case of an adult, " who took the decoction in large quantities, *with* " *the effect of discharging great numbers of worms,* " it seemed to occasion some confusion of head, and " trembling of the hands. These, perhaps, were accidental symptoms: but I am disposed, with the " patient, to ascribe them to the medicine\*."

\* " Collections," &c. p. 62.

An eminent practitioner of medicine in Georgia, Dr. Smelt, is very much in the habit of prescribing this medicine in the circle of his extensive practice. He finds it an extremely useful vermifuge remedy, and, given in the proper dose, a safe one. The doctor relies so confidently on its virtues that he esteems it at least equal, if not superior to calomel as an anthelmintic. In his practice, it has often succeeded in expelling worms and curing patients, where calomel and most other remedies recommended in such cases, had failed\*.

To make myself certain of the power of the Azedarach on the human body, I made a few experiments to determine its effects on the pulse. I procured a small quantity of the dry powdered bark of the root, with which I made the following

\* The following extract of a letter from Dr. Smelt, of Georgia, to his student, Mr. Grimes, in Philadelphia, was communicated to me by this gentleman....It was dated....‘ Augusta, April 19th, 1802.

‘ The bark of the *Pride of India*, or *China Tree*, has long been in high repute as a vermifuge; in short, it is known as such to every old woman. I am candid when I say, it may, and ought to range among the first in the class of anthelmintics. I have given it in many urgent cases; where it has happily succeeded, even after the calomel had failed. I well remember the remark of a gentleman of observation, which was to this effect; “that, it had evidently saved his son’s life, and that he would not take £500 for the remedy.” I commonly recommend a strong decoction of it, in the dose of from two table-spoons-full to a gill, three or four mornings in succession, upon an empty stomach. The bark from the root in winter ought to be used, and in summer that from the body of the tree. Some do say that it produces torpor, but I have never been able to discover any soporific properties in it.’



## EXPERIMENT.

Having breakfasted very lightly, about half an hour after 8 o'clock, I took, at half after 10 o'clock, 15 grains of the powder. At this time my pulse beat 65 strokes in a minute, its natural standard.

In..... 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 70, 80, 90, 100,  
Pulse beat 66. 67. 70. 74. 76. 73. 69. 69. 67. 69. 69. 68. 65. 62. 60. 64.

110, minutes.

65. strokes.

In 5 minutes my pulse increased slightly in fulness....in 15, fulness increased....in 20, there was an evident tension....in 25, the fulness as well as the tension diminished; after 35 minutes had elapsed I felt a disagreeable sensation in my head, with some nausea; in 45 minutes the nausea diminished and the confusion of the head increased. In this state I continued until 70 minutes had expired. At the end of 80 minutes my pulse evidently changed; fell to 62 in a minute, its fulness and force being obviously reduced. In an hour and an half, although my pulse had lessened in the number of strokes, its fulness began to increase; in 100 minutes the head-ach was diminishing; after 110 minutes had elapsed the pulse raised to, and continued at its natural standard, but the disagreeable feeling in the head did not disappear until after the 130th minute. I should have observed that at the end of an hour the nausea had entirely gone off.

In this experiment I was assisted by my fellow-graduate, Mr. Thomas, who examined my pulse, at the various periods, which I have marked in the table.

That I, however, might not be deceived, as I was liable to be in a single experiment, I resolved to repeat it, not only on my own person, but to administer the medicine to others. To facilitate my inquiry, my equally amiable as intelligent friend, Mr. Hutchinson, of the Pennsylvania Hospital, politely gave me permission to exhibit the medicine to one or two of the patients under his care. These experiments, together with that of repetition on myself, I will now candidly relate, and afterwards make a few observations.

## EXPERIMENT.

I breakfasted more plentifully than before at the same hour, and at a quarter before 11 o'clock, I took 20 grains of the same powder I used in the preceding experiment. My pulse was at 80 strokes in a minute.

In..... 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 70, 80, 90, 100,  
Pulse beat 81. 84. 83. 78. 79. 80. 80. 80. 78. 75. 74. 72. 72. 70. 66. 70.

110, 120, 130, minutes.

72. 77. 80. strokes.

In 10 minutes my pulse was variable; in 15 it was less full, but more chorded; in 20 I experienced a slight confusion in the head, and a sense of heat in the face, with a warm skin; at the end of half an hour, my pulse still continued chorded with an increase of the confusion of the head and warmth of the skin; after 35 minutes had elapsed, the pulse was not so full and tense; I now felt a slight nausea, my face was much flushed, and my skin continued warm. When

50 minutes had expired, my pulse became soft, and the nausea was going off. In 55 minutes my pulse was much reduced in force, and I felt some head-ach; my face was very much flushed, and to these were superadded a feeling of drowsiness, and an uneasiness at the stomach. After an hour and a half had elapsed, my pulse, as the table shews was reduced to 66 strokes in a minute, being 14 below its standard and was soft. In 100 minutes, the fulness and force was still lower than natural, after that period it continued to raise until, in 130 minutes, it became natural in every respect. Shortly after, all my unpleasant feelings dissipated.

## EXPERIMENT.

To Mr. C—, in the Pennsylvania Hospital, his pulse beating 68 strokes in a minute, its natural standard; I gave 15 grains of the powder, about an hour and a half after his dinner.

In..... 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 70, 80, 90, 100,  
Pulse beat 69. 69. 72. 70. 69. 70. 71. 71. 72. 73. 70. 72. 72. 71. 69. 67.

110, 120, minutes.  
65. 68. strokes.

In 10 minutes his pulse increased in fulness; in 15 it was stationary; in 25 it increased in fulness and strength; in half an hour his face felt warm; in 40 minutes his pulse became somewhat tense; in 55 minutes his pulse much increased in fulness; in an hour his pulse became more tense, accompanied with a slight pain in his head and moisture in his hands; after 70 minutes had expired, the tension of the pulse



yet remained; in 80 minutes it began to diminish as well as the pain in the head, leaving a somewhat confused vision; in an hour and a half the pulse stationary; in 100 minutes the tension disappeared; in 110 minutes his pulse becoming more natural as to fulness and force; when two hours had elapsed his pulse returned to its natural standard in every respect, and continued so.

## EXPERIMENT.

To W. R. a stout, strong, and except his labouring under atonic mania, an healthy man, in the Pennsylvania Hospital, I gave 20 grains of the medicine an hour after his dinner, his pulse being at the standard of 82 strokes in a minute.

In..... 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 70, 80, 90, 100,  
Pulse beat 82. 82. 85. 85. 85. 86. 88. 87. 87. 88. 88. 90. 88. 86. 84. 80.

110, 120, 130, minutes.

86. 84. 82. strokes.

In 25 minutes his pulse increased in fulness and force; in an half hour, these still continued to increase....in 35 minutes yet raising....in 45 his pulse was much more full and forcible than natural....at this time he complained of sickness at the stomach; his skin was warm, and his face flushed. After the elapse of an hour, his pulse still increased; from that time, until an hour and a half after he had taken the medicine, it lowered in fulness, force and frequency; and in 130 minutes it became natural, and continued so.

The identity of result, in the preceding experiments left me no doubt of the power and activity of my medicine. To render my experiments still more conclusive, as well to vary them, in order to observe the comparative strength of the various preparations, as to preclude the possibility of mistake, or the undue operation and influence of an improper bias on my mind, I procured, by the assistance of Dr. Barton, a quantity of the fresh root of the Azedarach, and having properly prepared a strong decoction of the bark of the root only, I made the following

### EXPERIMENT.

Having breakfasted very lightly at half an hour after eight o'clock, I took at half after nine, one half ounce measure of the saturated decoction, which I had made. My pulse beat 72 strokes in a minute.

|            |   |
|------------|---|
| In.....    | 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 70, 80, 90, 100, |
| Pulse beat | 76. 78. 80. 74. 76. 68. 64. 68. 68. 66. 64. 69. 64. 69. 65. 60. |
|            | 110, 120, 130, 140, 150, 160, minutes.                          |
|            | 63. 67. 64. 60. 64. 72. strokes.                                |

In 5 minutes my pulse was somewhat increased in force: in 15 it was chorded and variable: in 25 not so full: in half an hour it was not so tense: in 35 minutes it became variable: in 40 stationary: in 55 it was considerably reduced....in an hour my pulse began to raise, at this time I repeated the dose, in 70 minutes my pulse was very variable, and somewhat stronger; when 80 minutes had elapsed, I felt

a slight confusion of the head, with a frequent disposition to stretch and yawn; in 100 minutes my pulse became very much chorded....after 2 hours had expired, it became more natural, and I found the uneasy sensations I had laboured under, were going off....when 140 minutes had elapsed, the pulse had fallen to 60, being 12 below its standard; in 2 and a half hours it raised 4 strokes, and in 10 minutes more, to wit, after 160 minutes had expired, it returned to its natural standard in every respect, and I felt entirely clear of all unpleasant sensations.

## EXPERIMENT.

To my friend and fellow graduate Mr. Washington, I gave an ounce measure of the same decoction at 40 minutes after 10 o'clock, he having breakfasted slightly at half-after 8 o'clock....His pulse being at the standard of 80 strokes in a minute.

In..... 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 70, 80, minutes.  
Pulse beat 82. 84. 83. 80. 76. 78. 76. 72. 70. 74. 76. 80. 80. 80. strokes.

In 15 minutes his pulse had increased in fulness and force, considerably; in 20 it continued to increase; in 25 it became tense; in half an hour the tension increased: in 35 minutes the tension began to diminish, and left the pulse less full and strong; after 40 minutes had elapsed, the pulse still lowered the tension being entirely removed; at the expiration of 45 minutes his pulse still continued to decrease in fulness and strength; in 50 minutes it began to raise in every respect, and he had a considerable flushing in his face: in 55 minutes pulse nearly sta-

tionary: in an hour it had almost raised to its natural standard, as to fulness and force; and became natural and continued so, when 70 minutes had expired.

### EXPERIMENT.

My friend Mr. Hartshorne took 10 grains of the resinous part of the Azedarach, procured from its tincture, by evaporation. It accelerated his pulse considerably....increased its fulness, and strength; produced a glow in his face, and gave him an headache, which continued for two hours....about which time it left him.\*

### EXPERIMENT.

My friend and fellow-graduate, Mr. Price, having breakfasted as usual, at half-after 8, took at 25 minutes after 10 o'clock, 10 grains of the extract of the Azedarach procured by the evaporation of its tincture. His pulse was at the standard of 80 strokes in a minute.

In..... 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 70, 80, 90,  
Pulse beat 82. 84. 80. 76. 74. 72. 72. 70. 68. 70. 68. 70. 74. 76. 78.

100, minutes.

80. strokes.

In 5 minutes his pulse increased considerably; in 10 it continued to increase; in 15 it became tense; in 20 the tension increased; he now felt a sickness at the stomach: in 25 minutes pulse continued tense;

\* Not having a stop watch of proper form, I was unable to attend particularly to the pulse. Mr. H. however noticed the above effects.

in half an hour it might be termed a jerking pulse; at this time the nausea began to diminish; when 35 minutes had elapsed, the pulse fell in fulness and force; in 45 it became very soft; after 50 minutes had elapsed, the pulse still lowered....In an hour it began to rise: and continued rising until at the end of an hour and a half, it became natural in every respect.

### EXPERIMENT.

I gave to a cat, which I had procured for that purpose, a large dose of a strong decoction of our medicine. Its first operation was to make her extremely restless and uneasy; in a short time she showed a disposition to vomit, and seemed very much agitated. During this time she made every effort to escape from confinement....becoming, at length more quiet, she seemed to grow drowsy, and finally laid down, with every appearance of languor and stupor. At this time she would scarcely move when goaded, much less did she attempt to escape, when an opportunity offered...at the end of two hours, those symptoms were banished, and she appeared as lively as ever.

### EXPERIMENT.

I injected into my urethra a portion of the *infusion* of the Azedarach. Upon retaining it but a short time, it gave me so much pain, that I was compelled to discharge it. The pain continued several minutes after. The same

## EXPERIMENT

being repeated by injecting some of the *infusion* into the urethra of a friend, the same result ensued, with somewhat more severity. The gentleman declared that the pain excited by it, was more severe than that produced by a strong solution of the acetite of lead.

## EXPERIMENT.

Having added to a small quantity of the decoction of the Azedarach, a few drops of the solution of the sulphate of iron, a deep black colour was instantly struck.

## EXPERIMENT.

Having added to a small quantity of the *watery infusion* of the root of the Azedarach, some of the solution of the sulphate of iron, a slight colour appeared, by no means so deep as in the preceding experiment.

## EXPERIMENT.

I poured a few drops of the solution of the sulphate of iron, into a quantity of the tincture of the Azedarach, and an intense black colour was struck. This experiment, I must own is not conclusive, as the spirit with which the tincture was made must be supposed to contain a gallic acid.

## EXPERIMENT.

I submitted a quantity of the bark of the root of the Azedarach to slow distillation in a quantity of



water; a colourless liquor, containing no oil, much impregnated with the odour and somewhat with the taste of the medicine came over.

### EXPERIMENT.

To a portion of this liquor I added some of the solution of the sulphate of iron. This combination produced no colour whatever; whence I conclude the spirit contained none of the resin of the plant.

### EXPERIMENT.

I immersed a number of earth-worms in different portions of the decoction of the Azedarach, and some also in water, to observe the comparative effects produced on them. Instantly as they were thrown into the decoction, they were violently convulsed. This effect soon ceased. In a short time they were rendered unable to crawl along the sides of the glasses in which they were placed. At the end of 35 minutes they were all killed, the largest in size not maintaining life longer than the smallest. Those in the water were not injured but retained their liveliness.

From the face of these experiments, candidly stated, and many of them several times repeated, it appears that, would our time permit, much might be said. The conclusions to be drawn from them, and indeed which present themselves, must be obvious to every reflecting mind. They are of great importance. They incontestibly prove that our medicine is an extremely powerful and active article of the *Materia Medica*. They lead us to hope that its use may

not only be serviceable in a single disease, but that it may be beneficially applied in medical practice, in the cure of many diseases.

The analysis of that part of the plant, which I used, sufficiently shews, that it contains a large portion of *resino-gummos* matter. The proportion of the resin to that of the gum is very unequal; the one being in abundance and the other in scarcity. I had no opportunity of ascertaining whether the Azedarach contains any thing besides these, but am inclined to imagine that if properly examined, by the assistance of a complete chemical apparatus, it would be found to abound in various substances, as saccharum, &c.

Of its operation on the animal system, we are now prepared to judge. No one can hesitate to believe that it is a very powerful stimulant, for the facts, which I before mentioned, and the experiments I have just related, place it beyond the shadow of a doubt. The violent effects which are almost always observed to result from an excessive use of it, together with its great tendency to raise the arterial action in the human body, proves that it is not only an incitant, but that it is a stimulant of much strength.

Equally evident, too, is it, that our medicine possesses a considerably anodyne quality. This narcotic power seems to be uniformly exerted on the living system, when applied to it, for in almost all of the experiments I made, it excited a drowsiness and languor, which went off in common with the rest of the symptoms which it excited. Indeed, this quality seems to be one of the most prominent with which it is endued.

That it is a diaphoretic, if properly exhibited with a view to produce a diaphoresis, I infer, from its usual determination to the skin, particularly in the face, and in one or two instances to the hands. I did not carry the experiments far enough to establish the fact of its being a diaphoretic. We find too, that all nauseating medicines determine to the surface, particularly when exhibited in very small doses. I did not perceive it to act as a diuretic.

Although the Azedarach did not puke in any of my experiments, I am inclined to believe, it has an emetic power. It is, however, not sufficient to cause it to be employed as an emetic, for possessing an anodyne power superior to its emetic, it will not vomit unless taken in very large doses, which may be attended with much hazard. At all events, as an emetic it is not certain, and cannot therefore be relied on. It rarely failed to nauseate for a while.

Neither did I observe that it acted, in any manner, as a cathartic. Of such a quality I suppose it free. As an astringent and a narcotic it seems rather to prevent than to excite a catharsis. Did it possess this effect, it appears probable that the violent appearances which we have observed to take place, would not, at least to so great a degree, result from an excessive use, or rather abuse, of it.

I judge of its astringency by the experiments which I made, and varied, with the different preparations of it, and the solution of sulphate of iron. I have proved that the resinous principle predominates in the bark, which we used....and I have also proved that the gum contained little, if any, of the astringency contained in the vegetable, the resin of which is alone,

the active power. Its astringency proves its tonic quality, for, as I shall hereafter observe, it is a conceded doctrine that the astringents are, in some degree, tonics.

It might be here expected that I should say something of the pharmaceutical treatment of the Azedarach. This I shall comprise in a few words. I suppose that the *bark* alone will be uniformly used in medicine. This, when fresh, may be used in form of a decoction, most conveniently; when dry, it may be pulverized and given in that form. It may, perhaps, be proper to keep in the shops an extract. This is a powerful formula of the medicine, and may be procured in the usual way, either by the expression of the recent root, leaves, berries, &c. and after inspissation; or, it may be obtained by evaporation, as in the analysis I made of it.

I would advise a tincture, which may be made of either the dried or the recent root, &c. This is sometimes the most agreeable, as well as convenient, form of exhibiting it; and given as a bitter, it may be the most useful. In some cases, where it might be feared that the medicine, given in the forms above recommended, might be too active, I think we should find it proper to give it in infusion.

An ointment, by being made of the oil of the fruit of the Azedarach, in the usual mode, would, I dare say, answer very good purposes in practice, particularly in cases of eruptive diseases, which require local applications. It is recommended in *Tinea Capitis*, and, doubtless, may be used with good effect.

In recapitulation. The doses, as must occur to every one's mind, must be regulated by circumstances

and experience, When they are required to be often repeated, they must be, in proportion, reduced in size. For an adult, and not to repeat the dose often, I think the following proportions of the medicine, in its various forms, would be sufficient....Of the decoction, the medium dose about six drachms, or one ounce:....Of the infusion from one ounce to one and a half:....Of the tincture, if strong, from one to four drachms:....Of the resin, alone, from five grains, to an half scruple:....Of the common extract, from a half scruple, to 15 grains:....and of the powder, from 10 or 12 grains, to a scruple. These preparations I speak of, as being made from the root. I do not include the leaves and berries.

I will now close my essay, by enumerating the numerous diseases, in which I think, the Azedarach may be beneficially, if properly, applied. It is necessary for me to observe, that its employment should never be had recourse to, in the first stages of inflammatory idiopathic diseases, in which there already always exists an excessive action of the arterial system. We must now be certain, from what we know of this medicine, that in such cases it would not only be injurious, but absolutely and highly dangerous. In the second or later stages, however, of such diseases, after the excitement of the body has been sufficiently subdued, we may, reasoning *a priori*, recur with advantage to this important medicine. The first disease I shall mention it in, is that

#### OF WORMS.

Of its application in those sometimes-unmanageable cases, I have already spoken. Experience has taught us that it is serviceable, but we are yet shut



up in the dark as to its *modus operandi*. Whether it be a chemical or a mechanical remedy, or whether its qualities partake of both powers, remains to be decided. My experiments seem to prove that it does not evacuate by the intestinal canal, for it neither puked nor purged in any instance. This would draw us to the conclusion that, as it does not, in an eminent degree, excite the peristaltic motion of the intestines; and as it cannot act, like the filings of tin, &c. by forcibly detaching the worms, it possesses a poisonous quality, which is noxious to these troublesome animals. This opinion necessarily involves us in the belief that it acts chemically; and, therefore, that it does not merely expel the worms from, but that it actually kills them in, the intestines. It is a well-attested fact, that many substances, which are innocent to some animals, are highly injurious to others; nay, that a substance may at the same time be food for one, whilst its consumption may produce the death of another animal. The Azedarach is evidently poisonous to worms, and it is certainly injurious in its effects, when applied to the human body. This strengthens the idea, that its anthelmintic qualities arise from its poisonous nature. Here, however, we might seem to place ourselves in a dilemma; for it may be properly asked, why are not all poisons and narcotics anthelmintics? The answer has been made. Poisons do not act alike on all animals; all of them, therefore, may not act particularly on worms.

#### OF DIARRHOEA.

This disease, as depending upon debility, laxity, or want of tone in the intestines, may be remedied by the Azedarach. In giving it, however, in this



disease, we should be very careful, and ascertain well the state of the system, for it not seldom happens, that here, appearances are deceitful, in which cases our medicine, far from affording relief, may do much mischief.

#### OF DYSENTERY.

This cruel disease, now known to be a state of fever, retroverted on the intestines, is, in its first stages, a disease of excitement, which loudly calls for great depletion. The most prominent symptom is the constipation of bowels, which almost invariably takes place, and which it is of primary importance to remove. The inflammatory symptoms being entirely obviated, physicians are in the habit, and very properly, of exhibiting opiates, and sometimes astringents. In the period of the disease, in which these last remedies may be relied on, I think the Azedarach might be advantageously exhibited. Its astringent qualities are well calculated to restrain the tenesmus, which usually remains, even after the bowels have been sufficiently evacuated, and its aroma and bitter principle are qualities, which seem peculiarly fitted to restore the tone of the intestines, which is generally pretty much impaired.

#### OF MANIA.

From the apparent peculiar determination to the head, of this medicine, I am led to suppose, that it would be proper to exhibit it in those cases of atonic madness, where it is always found necessary to rouse into action the suspended or lost power of the brain. The resemblance of the properties of the Azedarach

with those of the Stramonium,\* as it respects their effects on the human body, directs us to imagine that it would be a safe and proper remedy, if exhibited at a proper time, and in a proper manner, with a sufficient care and a due attention to the state of the system. If analogical reasoning be admitted in a case of this kind, we may safely presume from its effects on the head, that it would be a serviceable remedy in the cases I have mentioned.

#### OF EPILEPSY.

This disease we know, sometimes proceeds from, and is often kept up by, worms. It is therefore, in these cases, a symptomatic disease. In attending to it, we are not to overlook the cause, whence it originated, but should direct our efforts to remedy this, either by obviating or removing it. Having ascertained that the Azedarach is a valuable anthelmintic we should not hesitate a moment to prescribe it in those cases of Epilepsy which we know to be symptomatic and depending upon worms. I know no medicine, from which we may more confidently hope for a cure. In Epilepsy originating from other causes it would be of no avail: perhaps it might injure.

#### OF INTERMITTENTS.

I am informed that in Virginia this medicine has been often given in Intermittents, in the form of a decoction with the most astonishing success. This I can readily conceive. The analysis I have subjected it to, proves that it is considerably astringent, and

\* Vide an elegant, learned and ingenious, "Inaugural Dissertation on Stramonium," by the late much-lamented Samuel Cooper, M. D.

the taste is sufficient to detect its bitterness. There is scarcely any, if there be one, exception to the opinion that all astringents are tonic\*. We know that bark and other tonics, when properly administered, cure Intermittents; and we also know that Gentian and various other bitters, have the same effect. Why then, may not the Azedarach, which eminently combines in itself, the qualities of both, also have the same effect in curing Intermittents? Experience shews that it has; and hence the confidence placed in the medicine in Virginia, where it is, particularly amongst children whose complaints are mostly supposed to be derived from worms, a panacea†.

#### OF RHEUMATISM.

In the low chronic stages of this disease, perhaps the Azedarach would be found useful. The exhibition of it in this disease would require some care and attention, for such is sometimes the strength of the arterial action, that even when it has continued for a long time, blood-letting and other depletives are found necessary and cannot be dispensed with. If then, our medicine be given in these stages, it would be likely to add fuel to the fire already raging too violently. It must, therefore, be withheld until the strength of the disease be wasted away, or until the situation of the patient require that his strength should be renovated. Under the same regulations it might be safely given in cases

\* Vide MSS. Lectures on Materia Medica, by Professor Barton.

† Information from Mr. Nelson, of whom I have before spoken.

## OF GOUT,

For from the analogy between these diseases, it is a just inference that one remedy would be equally and alike useful in equal and alike stages of those disorders.

## OF CONSUMPTION.

The Protei-form appearances, which this generally-fatal disorder usually assumes, render it almost impossible for me to determine whether the use of the Azedarach be admissible in cases of consumption. If, however, it should be found useful, it will be in the last stages, when the state of the system demands the stimulating regimen as a last resource to retain departing life.

## OF ERUPTIONS.

That the oil of the fruit of the Azedarach is a good antipsoric, we have undoubted proof, from good authority.\* Provided it be serviceable only in *Tinea Capitis*, in which alone of the eruptive diseases, it has been used, it must recommend itself to our attention. To procure a speedy and effective remedy for this disagreeable disease is a desideratum in medicine. I think it ought to be applied to practice in this form; and it seems not improbable that upon experience it will be found to be an agreeable, certain, and safe remedy.

In a word, it will be seen from what I have said that I recommend the Azedarach, in those cases only, wherein the action of the system is reduced to the stimulating point. I have cautioned against its use in all other cases, for in these, I believe it would be hurtful.

\* Vide, p. 24.

I have thus drawn to a conclusion, my remarks on this subject....a subject of great importance; one, the most valuable principles of which, I dare say I have overlooked; and one, which I have not done justice to. If, however, this feeble attempt, made by a *Tyro* in medicine, confined to the short space of time usually allotted for the preparation of a Thesis, be found acceptable to those, to whom it is addressed; for whose eye it is intended; and to whose examination it is now submitted, I shall feel a distinguished satisfaction. The world cannot condemn me for temerity.... I write not for fame: it cannot condemn me for vanity ....I write from necessity: neither can it condemn me for giving publicity to this imperfect history ....the laws of the university require it. These considerations acquit me in my own eyes; in the eyes of the world they must have some weight.

THE END.

*Errata*

In p. 9. l. 9 for as it respects read as they respect.  
 20. l. 9 from the bottom, for enables, read enable.  
 31 l. 1 for persuaded read persuaded.





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